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QuickDraw 3D Glossary of Terms - P to S (1/96)

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TOPIC -----

This article is a glossary of terms for QuickDraw 3D.

DISCUSSION -----

parallel projection: A method of projecting a model onto a viewing plane that uses parallel projectors. See also oblique projection, orthographic projection. Compare perspective projection.
parameterization A parametric function that picks out all points on a geometric object, such as a pixmap or a surface. Compare surface parameterization.

parametric curve: Any curve whose points are described by one or more parametric functions. A two-dimensional parametric curve can be described by the parametric functions $x = x(t)$ and $y = y(t)$. A three-dimensional parametric curve is described by the parametric functions $x = x(t)$, $y = y(t)$, and $z = z(t)$. Compare B-spline polynomial, nonuniform rational B-spline (NURB).

parametric equation: See parametric function.

parametric function: A function of one or more parameters (often denoted by s and t or u and v).

parametric point: A position in two- or three-dimensional space picked out by a parametric function. Defined by the TQ3Param2D and TQ3Param3D data types. Compare point, point object, rational point.

parent class: The class (if any) of which a given class is a subclass. In other words, a class' parent class is the class immediately above that class in the QuickDraw 3D class hierarchy. For example, the shape class is the parent class of the light class. Also called a base class or a superclass.

patch: A portion of a surface defined by a set of points. Compare NURB patch.

perspective foreshortening: A feature of perspective projections wherein the size of a projected object varies inversely with the distance of the object from the center of projection.

perspective projection: A method of projecting a model onto a viewing plane that uses nonparallel projectors. Compare parallel projection.

Phong illumination: A method of calculating the illumination of a point on a surface based on both diffuse reflection and specular reflection. Compare Lambert illumination, null illumination.

Phong illumination shader: An illumination shader that implements a Phong illumination model. Compare Lambert illumination shader, null illumination shader.

Phong shading: A method of shading surfaces in which the incident light color and intensity are calculated for a series of points along each edge of a polygon and then interpolated across the entire polygon. Compare constant shading, Gouraud shading.

pick: (n.) See pick object. (v.) To determine whether a specified object is close enough to a pick geometry for a hit to be recorded.

pick data structure: A data structure that contains basic information about a pick object. Defined by the TQ3PickData data type.

pick detail: See hit information mask.

pick geometry: The geometric object used in any picking method.

pick hit: See hit.

pick hit list: See hit list.

picking: The process of identifying the objects in a view that are close to a specified geometric object.
picking flag A binary flag in a group state value that determines whether a group is eligible for picking. Compare drawable flag, inline flag.

picking ID: An arbitrary 32-bit value that you can use to determine which object was selected by a pick operation.

picking ID style: A type of style object that determines the picking ID of an object or group of objects in a model.

picking loop: A section of code in which all picking takes place. A picking loop begins with a call to the Q3View_StartPicking routine and should end when a call to Q3View_EndPicking returns some value other than kQ3ViewStatusRetraverse. A picking loop is a type of submitting loop. See also bounding loop, rendering loop, writing loop.

picking parts style: A type of QuickDraw 3D object that determines which parts

of a geometric object (for instance, a mesh) are eligible for inclusion in a hit list.

pick object: A QuickDraw 3D object that is used to select geometric objects in a model that are close to a specified geometric object. A pick object is an instance of the TQ3PickObject class.

pick origin: A point in space that determines the origin of sorting hits. Compare metric pick object.

pick parts mask: A value that indicates the kinds of objects placed in a hit list.

picture area: The portion of a window occupied by a viewer object that contains the displayed image.

pixel image: See pixmap

pixel map: See pixmap

pixmap: A two-dimensional array of values, each of which represents the color of one pixel. Defined by the TQ3Pixmap data type. See also bitmap, storage pixmap.

pixmap draw context: A draw context that is associated with a pixmap.

pixmap draw context data structure: A data structure that contains information about a pixmap draw context. Defined by the TQ3PixmapDrawContextData data type.

pixmap texture object: A texture object in which the texture is defined by a pixmap.

planar: Contained completely in two dimensions (as, for example, a circle). See also spatial.

plane constant: The value d in the plane equation $ax+by+cz+d = 0$.

plan elevation projection: See top elevation projection.

plane equation: An equation that defines a plane. A plane equation can always be reduced to the form $ax+by+cz+d = 0$. Defined by the TQ3PlaneEquation data type.

point: A dimensionless position in two- or three-dimensional space. Defined by the TQ3Point2D and TQ3Point3D data types. Compare parametric point, point object, rational point.
point light A light source that emits rays of light in all directions from a specific location.

point light data structure: A data structure that contains information about a point light. Defined by the TQ3PointLightData data type.

point object: A dimensionless position in three-dimensional space, with an optional set of attributes. Defined by the TQ3PointData data type.

point of interest: The point in world space at which a camera is aimed. The

point of interest and the camera location determine the viewing direction.

point pick object: See window-point pick object.

polar coordinate system: A system of assigning planar positions to objects in terms of their distances (r) from a point (the polar origin, or pole) along a ray that forms a given angle (q) with a coordinate line (the polar axis). The polar origin has the polar coordinates $(0, q)$, for any angle q . Compare Cartesian coordinate system, spherical coordinate system.

polar axis: A fixed ray that radiates from the polar origin, in terms of which polar coordinates are determined. Also called the initial line.

polar origin: The point in a plane from which the polar axis radiates. Also called the pole.

polar point: A point in a plane described using polar coordinates.

pole: See polar origin.

polygon: A closed plane figure. See general polygon, simple polygon.

polygon mesh: A mesh whose faces are composed of polygons.

polyhedron: A solid figure composed of faces.

postmultiplied: A term that describes the order in which matrices are multiplied. Matrix $[A]$ is postmultiplied by matrix $[B]$ if matrix $[A]$ is replaced by $[A] \times [B]$. Compare premultiplied.

premultiplied: A term that describes the order in which matrices are multiplied. Matrix $[A]$ is premultiplied by matrix $[B]$ if matrix $[A]$ is replaced by $[B] \times [A]$. Compare postmultiplied.

primitive: See geometric primitive.

private: See opaque.

projection: (1) A method of mapping three-dimensional objects into two dimensions. See also parallel projection, perspective projection. Compare camera object. (2) The image on the view plane that results from mapping three-dimensional objects into two dimensions.

projection plane: See view plane.

projective transform: See frustum-to-window transform.

projector: A ray that intersects both a point on an object in a model and the view plane, thereby projecting the object in the model onto the view plane.

prototype: The object (or collection of objects) represented in a model. Compare model, synthetic. prototypical Of or pertaining to a prototype. Compare model, synthetic.

proxy display group: See I/O proxy display group.

quaternion: A quadruple of floating-point numbers that obeys the laws of quaternion arithmetic. Defined by the TQ3Quaternion data type.

quaternion transform: A type of transform that rotates and twists an object according to the mathematical properties of quaternions.

QuickDraw: A collection of system software routines on Macintosh computers that perform two-dimensional drawing on the user's screen.

QuickDraw 3D: A graphics library developed by Apple Computer, Inc., that you can use to create, configure, render, and interact with models of three-dimensional objects. You can also use QuickDraw 3D to read and write 3D data.

QuickDraw 3D class: A structure for the data that characterize QuickDraw 3D objects, together with a set of methods that operate on that data. Compare QuickDraw 3D object. See also child class, leaf class, parent class.

QuickDraw 3D class hierarchy: The hierarchical arrangement of QuickDraw 3D object classes.

QuickDraw 3D object: Any instance of a QuickDraw 3D class. See also object type.

QuickDraw 3D Object Metafile (3DMF): An extensible file format defined by Apple Computer, Inc., for storing 3D data and interchanging 3D data between applications.

QuickDraw 3D Pointing Device Manager: A set of functions that you can use to manage three-dimensional pointing devices.

QuickDraw 3D shading architecture: An environment in which shaders can be applied at various stages in the imaging pipeline.

radius vector: The ray that radiates from the polar origin and that forms a given angle with the polar axis (or two given angles with the x and z axes). A polar or spherical point lies at a given distance along the radius vector. See also polar coordinate system, spherical coordinate system.

rasterization: The process of determining values for the pixels in a rendered image. Also called scan conversion.

rational point: A dimensionless position in two- or three-dimensional space together with a floating-point weight. Defined by the TQ3RationalPoint3D and TQ3RationalPoint4D data types. Compare point.

ray: A point of origin and a direction. Defined by the TQ3Ray3D data type.

real: See prototypical.

rectangle pick object: See window-rectangle pick object.

reference count: The number of times a shared object is being accessed.

render: To create an image (on the screen or some other medium) of a model.renderer See renderer object.

renderer object: A QuickDraw 3D object that you can use to render a model—that is, to create an image from a view and a model. A renderer object is an instance of the TQ3RendererObject class.

rendering: The process of creating an image (on the screen or some other medium) of a model. See also rasterization.

rendering loop: A section of code in which all rendering takes place. A rendering loop begins with a call to the Q3View_StartRendering routine and should end when a call to Q3View_EndRendering returns some value other than kQ3ViewStatusRetraverse. A rendering loop is a type of submitting loop. See also bounding loop, picking loop, writing loop.

retained mode: A mode of defining and rendering a model in which the graphics library (for instance, QuickDraw 3D) maintains a copy of the model. See also immediate mode.

retained object: An object that is defined and rendered in retained mode. See also immediate object.

RGB color space: A color space whose three components measure the intensity of red, green, and blue.

RGB color structure: A data structure that contains information about a color. Defined by the TQ3ColorRGB data type.

right-handed coordinate system: A coordinate system that obeys the right-hand rule. In a right-handed coordinate system, positive rotations of an axis are counterclockwise. Compare left-handed coordinate system.

right-hand rule: A method of determining the direction of the positive z axis (and thereby the front of a planar surface). According to the right-hand rule, if the thumb of the right hand points in the direction of the positive x axis and the index finger points in the direction of the positive y axis, then the middle finger points in the direction of the positive z axis. Compare left-hand rule.

rotate: To reposition an object by revolving (or turning) each point of the object by the same angle around a point or axis.

rotate-about-axis transform: A type of transform that rotates an object about an arbitrary axis in space by a specified number of radians at an arbitrary point in space.

rotate-about-axis transform data structure: A data structure that contains information on a rotate transform about an arbitrary axis in space at an

arbitrary point in space. Defined by the TQ3RotateAboutAxisTransformData data type.

rotate-about-point transform: A type of transform that rotates an object about the x, y, or z axis by a specified number of radians at an arbitrary point in space.

rotate-about-point transform data structure: A data structure that contains information on a rotate transform about an arbitrary point in space. Defined by the TQ3RotateAboutPointTransformData data type. rotate button A button in the controller strip of a viewer object that, when clicked, puts the cursor into rotate mode. Subsequent dragging of the cursor in the picture area causes the displayed object to rotate in the direction in which the cursor is dragged. Compare camera angle button, distance button, move button, zoom button.

rotate transform: A type of transform that rotates an object about the x, y, or z axis at the origin by a specified number of radians.

rotate transform data structure: A data structure that contains information about a rotate transform. Defined by the TQ3RotateTransformData data type.

rotation: A transform that causes an object to revolve around a point or an axis. Compare rotate-about-axis transform, rotate-about-point transform, rotate transform.

scalar product: See dot product.

scale: To reposition and resize an object by multiplying the x, y, and z coordinates of each of its points by values d_x , d_y , and d_z . Compare differential scaling, uniform scaling.

scale transform: A type of transform that scales an object along the x, y, and z axes by specified values.

scan conversion: See rasterization.

scene: A combination of objects, lights, and draw context.

screen coordinate system: See window coordinate system.

screen space: See window coordinate system.

screen-space picking: The process of testing whether the projections of three-dimensional objects onto the screen intersect or are close enough to a specified two-dimensional object on the screen.

screen-space subdivision: A method of subdividing smooth curves and surfaces. In this method, the renderer subdivides a curve (or surface) into polylines (or polygons) whose sides have a maximum length of some specified number of pixels. Compare constant subdivision, world-space subdivision.

serpentine: Said of a trigrid in which quadrilaterals are divided into triangles in an alternating fashion.

set: See set object.

set object: A collection of zero or more elements, each of which has both an element type and some associated element data. A set object is an instance of the TQ3SetObject class.

shader: See shader object.

shader object: A type of QuickDraw 3D object that you can use to manipulate visual effects that depend on the illumination provided by a view's group of lights, the color and other material properties (such as the reflectance and texture) of surfaces in a model, and the position and orientation of the lights and objects in a model. A shader object is an instance of the TQ3ShaderObject class. shading parameterization A surface uv parameterization used when shading a surface.

shadow-receiving style: A type of QuickDraw 3D object that determines whether or not objects in a model receive shadows when obscured by other objects in the model.

shape: See shape object.

shape object: A type of QuickDraw 3D object that affects how and where a renderer renders an object in a view. A shape object is an instance of the TQ3ShapeObject class.

shape part: See shape part object.

shape part object: A distinguishable part of a shape object. A shape part object is an instance of the TQ3ShapePartObject class. See also mesh part object.

shared object: A QuickDraw 3D object that may be referenced by many objects or the application at the same time. A shared object is an instance of the TQ3SharedObject class.

side elevation projection: A type of elevation projection in which the view plane is parallel to a side of the object being projected.

simple polygon: A closed plane figure defined by a list of vertices (that is, defined by a single contour). Defined by the TQ3PolygonData data type. See also general polygon.

smooth shading: See Gouraud shading, Phong shading.

space: (1) See coordinate system. (2) The two- or three-dimensional extent defined by a coordinate system.

spatial: Contained completely in three dimensions (as, for example, a box). See also planar.

specular coefficient: A measure of an object's level of specular reflection.

specular color: The color of the light of a specular reflection.

specular control: See specular reflection exponent.

specular exponent: See specular reflection exponent.

specular highlight: A bright area on an object's surface caused by specular reflection.

specular reflection: The type of reflection that is characteristic of light reflected from a shiny surface. Compare diffuse reflection.

specular reflection coefficient: See specular coefficient.

specular reflection exponent: A value that determines how quickly the specular reflection diminishes as the viewing direction moves away from the direction of reflection.

spherical coordinate system: A system of assigning spatial positions to objects in terms of their distances from the origin (r) along a ray that forms a given angle (φ) with the x axis and another angle (θ) with the z axis. Compare Cartesian coordinate system, polar coordinate system. spherical point A point in space described using spherical coordinates.

spot light: A light source that emits a circular cone of light in a specific direction from a specific location. See also fall-off value, hot angle, outer angle.

spot light data structure: A data structure that contains information about a spot light. Defined by the TQ3SpotLightData data type.

standard I/O library: A collection of functions that provide character I/O and file manipulation services for C programs. Compare UNIX storage object.

standard surface parameterization: A parametric function that maps the unit square to an object's surface. Compare custom surface parameterization, natural surface parameterization.

storage object: A QuickDraw 3D object that represents any piece of storage in a computer (for example, a file on disk, an area of memory, or some data on the Clipboard). A storage object is an instance of the TQ3StorageObject class.

storage pixmap: A two-dimensional array of values contained in a storage object, each of which represents the color of one pixel. Defined by the TQ3StoragePixmap data type. See also bitmap, pixmap.

stream file: A metafile that contains no internal references. In other words, a file object that does not contain a table of contents and in which any references to objects are simply copies of the objects themselves. See also normal file, stream file.

stream mode: The mode in which a stream file is opened. See also database mode, normal mode.

string: See string object.

string object: A QuickDraw 3D object that contains a sequence of characters. A string object is an instance of the TQ3StringObject class. See also C string object.

style: See style object.

style object: A type of QuickDraw 3D object that determines some of the basic characteristics of the renderer used to render the curves and surfaces in a scene. A style object is an instance of the TQ3StyleObject class.

subclass: See child class.

subdivision method: A method of subdividing smooth curves and surfaces. See constant subdivision, screen-space subdivision, world-space subdivision.

subdivision method specifier: An indicator of the number of parts into which a smooth curve or surface is to be subdivided.

subdivision style: A type of QuickDraw 3D object that determines how a renderer decomposes smooth curves and surfaces into polylines and polygonal meshes for display purposes.

subdivision style data structure: A data structure that contains information about the type of subdivision of curves and surfaces used by a renderer. Defined by the TQ3SubdivisionStyleData data type. submit To make an object (or group of objects) eligible for drawing, picking, writing, or bounding box or sphere calculation. Compare submitting loop.

submitting loop: A section of code in which all submitting takes place. Compare bounding loop, picking loop, rendering loop, writing loop.

superclass: See parent class.

surface-based shader: A shader that affects the surfaces of geometric objects based on their material properties, position, and orientation (and other factors). Compare view-based shader.

surface parameterization: A parametric function that picks out all points on a surface. See also custom surface parameterization, natural surface parameterization, standard surface parameterization.

surface normal: See normal vector.

surface shader: A shader that is applied when calculating the appearance of a surface. Compare texture shader.

surface tangent: A pair of vectors that indicate the directions of changing u and v parameters on a surface. Defined by the TQ3Tangent2D data type.

surrounding light: See ambient light.

synthetic: Not real, as for example the objects in a model. Compare prototypical.

synthetic camera: See camera object.

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